

# FOX THERMAL TIP

## CAL-V™ Calibration Validation Test

### TEST FLOW METER ACCURACY

The CAL-V™ calibration validation feature is an in-situ calibration routine that validates the flow meter's accuracy by testing the functionality of the sensor and its associated signal processing circuitry.

### IN-SITU SOLUTIONS FOR FIELD VERIFICATION

CAL-V™ permits the user to validate the FT1 and FT4's calibration in the pipe, at process conditions. At the conclusion of the test, the meter will display a pass/fail message and the CAL-V™ data is saved in the meter for look-up at any time. CAL-V™ is an operator-initiated test and takes approximately three minutes to complete. Fox Thermal recommends the test be run under flowing conditions, but it can be performed at any flow rate, including zero flow.

### TEST DATA

During the test, the meter's microprocessor adjusts the signal to the sensor elements and determines the resulting electrical characteristics. These site-determined characteristics are compared with the data that was collected and stored in the instrument electronics during the most recent factory calibration. Matching data within established tolerances confirms the meter is measuring accurately.

### CALIBRATION VALIDATION CERTIFICATES

If initiated by Fox Thermal's FT View™ software tool, a CAL-V™ calibration validation certificate can be produced at the conclusion of the test. The certificate contains data/time of the test, pass/fail results, meter settings, and validation data.

### TEST FREQUENCY

Fox Thermal recommends CAL-V™ be run at least annually, but it can be performed as often as necessary for users to maintain compliance with applicable regulations and metrology requirements.

### FOX THERMAL CALIBRATION LAB

Fox Thermal's 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.

The image shows a 'FOX THERMAL FT4X CAL-V™ CERTIFICATE CALIBRATION VALIDATION'. It includes the company logo and contact information (399 Reservation Road, Marina, CA 93933 USA, Phone: 831-384-4300, Fax: 831-384-4312, sales@foxthermal.com). The certificate details the test performed on August 18, 2022, at 2:32:51 PM, using firmware version FT4X V7.3. The Fox Meter Serial Number is ENG100. The CAL-V™ Results are 'Pass' with a CAL-V™ value of 0.05. The Test Temperature is 77.3 F and the Tag #/Meter Location is 12345. The test was performed by John Doe. Additional comments mention 'Well #3'. A note explains that CAL-V™ is a calibration routine that validates the flow meter's calibration accuracy by testing the following: \* Repeatability of sensor, \* Repeatability of sensor electronics, and \* Confirms Calibration Algorithms. It also states that at the conclusion of the test, the meter will display a pass/fail message and the CAL-V™ data. A 'pass' result confirms the meter is measuring accurately. CAL-V™ limits are: ± 0 - 0.8 Pass, ± 0.8-1.0 Warning, > ± 1.0 Fail. The configuration section lists: Pipe Diameter: 9 in, Customer STP: 32.0 Deg F & 760.00 mmHG, 4-20 mA Range: 0 - 5001 SCFM, Zero Flow Cutoff: 1.6768366 SCFM, Previous CAL-V: 0.51, Previous CAL-V: Pass, Gross Heating Value(BTU/FT3): 605, Density(Kg/M3): 1.2332, Gas SelectX: Mix Gas, CO2: 40%, Methane: 56%, Nitrogen: 1%, Oxygen: 2%, Hydrogen: 1%.

Figure 1: Example of a pass result on a calibration validation certificate produced after running a CAL-V™ test using the FT4X View software.

### CALIBRATION VALIDATION

Calibration Validation is a built-in feature that can be performed in-situ. It is designed to:

- Test the functionality of the sensor and its associated signal processing circuitry
- Check for build-up on sensor that could affect calibration
- Ensure that the meter still retains its original NIST-traceable calibration
- Check thermal conductivity (heat transfer) repeatability of the sensor

Use Calibration Validation to assure the meter is functioning correctly and to produce records for regulatory compliance when needed.