

FOX TECH TIP

CAL-V™ Calibration Validation Test

TEST FLOW METER ACCURACY

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
- Verify that the meter is running accurately

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

IN-SITU SOLUTIONS FOR FIELD VERIFICATION

CAL-V™ permits the user to validate the FT1, FT4A, and FT4X 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, especially in smaller pipe sizes.

TEST DATA

During the test, the meter's microprocessor adjusts the signal to the sensor elements and determines the resulting electrical characteristics. It checks the functionality of the sensor and measurement circuitry. Test data will show a CAL-V™ value (ex: CAL-V: 0.05) that falls within a determined set of CAL-V limit ranges. These CAL-V™ values determine whether the CAL-V™ result will be a "PASS", "WARNING", or "FAIL".

TEST OPERATION OPTIONS

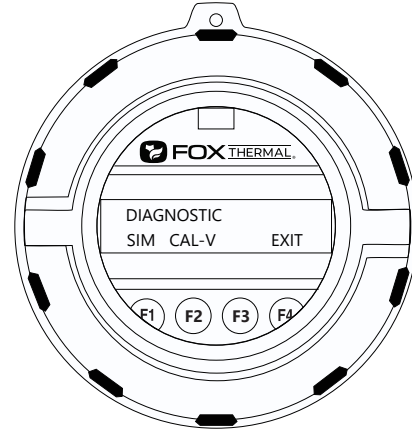
TEST PERFORMANCE METHODS

CAL-V™ can be performed in three ways:

- Front panel of the meter
- FT View™ Software (USB)
- Modbus RTU (RS485)

INITIATING TEST FROM THE FRONT PANEL

When using the front panel to perform a CAL-V™ test, the results of the last two tests are saved to the meter's memory. Use the front panel to access meter settings and view the CAL-V™ test data.



Example of accessing the CAL-V™ calibration validation test from the FT4X front panel.

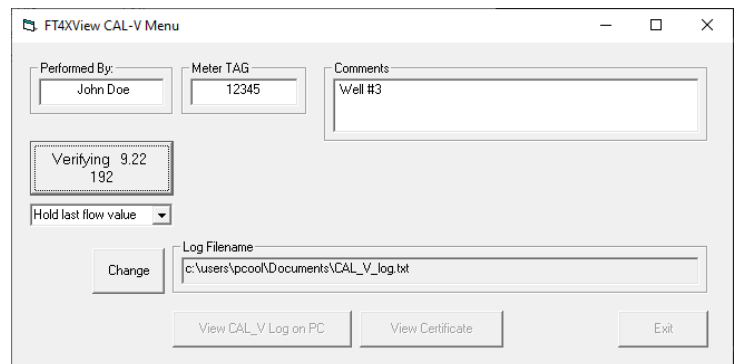
INITIATING TEST FROM MODBUS

When using Modbus to perform a CAL-V™ test, it is equivalent to running the test through the front panel. In addition, a calibration validation certificate can be generated when performing a CAL-V™ in the ModbusView™ Software with v8.3 meter firmware or higher.

INITIATING TEST FROM FT VIEW™ SOFTWARE

The FT View™ software will only save CAL-V™ data that was initiated from the software. This data is saved to the CAL-V™ log file of the User's choice.

When using the software, the User is able to save or print a calibration validation certificate. For more information on the CAL-V™ Certificate, see the next page.



Example of a CAL-V calibration validation test window found in the FT4X View™ software.

CALIBRATION VALIDATION CERTIFICATES

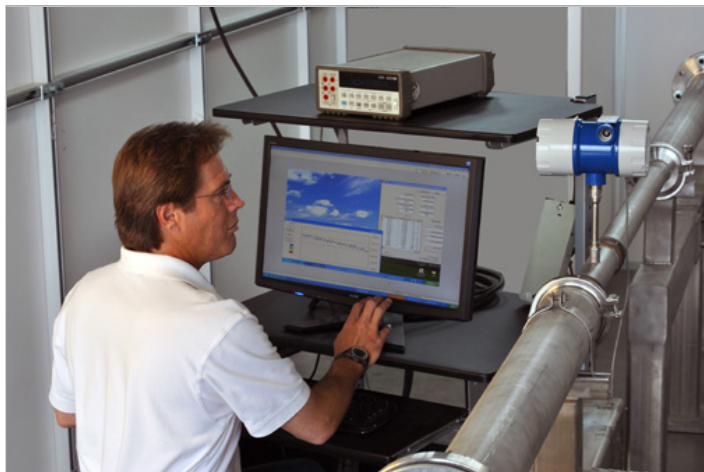
If initiated by Fox Thermal's FT View™ software tool or Modbus RTU (RS485), a CAL-V™ calibration validation certificate can be produced at the conclusion of the test. The certificate contains data/time of the test, pass/fail results, meter settings, and validation data.

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 calibration equipment is calibrated at appropriate intervals, monitored for stability, and under the custody of trained laboratory personnel. Measurement assurance procedures are maintained in the laboratory database to ensure that all calibrations are accurate, verifiable, and traceable to NIST primary standards.



Fox Thermal's Calibration Lab utilizes NIST-traceable equipment.



**FOX
THERMAL**

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FT4X CAL-V™ CERTIFICATE
CALIBRATION VALIDATION

CAL-V™ Performed on:	August 18 2022	2:32:51 PM
Firmware version:	FT4X V7.3	
Fox Meter Serial Number:	12345	
CAL-V™ Results:	Pass	
CAL-V™:	0.05	
Test Temperature:	77.3 F	
Tag #/Meter Location:	12345	
Test performed by:	John Doe	
Additional Comments:	Well #3	

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
* Confirms Calibration Algorithms
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: ± 0 - 0.8 Pass ± 0.8-1.0 Warning > ± 1.0 Fail

Configuration:			
Pipe Diameter:	9 in	Gas SelectX:	Mix Gas
Customer STP:	32.0 Deg F @ 760.00 mmHG		CO2 40%
4-20 mA Range:	0 - 5001 SCFM		Methane 56%
Zero Flow Cutoff:	1.6768366 SCFM		Nitrogen 1%
Previous CAL-V:	0.51		Oxygen 2%
Previous CAL-V:	Pass		Hydrogen 1%
Gross Heating Value[Btu/ft3]:	605		
Density[Kg/M3]:	1.2332		

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



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